NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

PIPELINE

(Feet)

Code 516

DEFINITION

Pipeline having an inside diameter of eight (8) inches or less.

PURPOSE

This practice may be applied as a part of a resource management system to convey water from a source of supply to points of use for livestock, poultry, wildlife, recreation, etc.

CONDITIONS WHERE PRACTICE APPLIES

Where it is desirable or necessary to convey water in a closed conduit from one point to another.

CRITERIA

Capacity. For livestock water, the installation shall have a capacity to provide seasonal high daily water requirements for the number and species of animals to be supplied. Animal water requirements can be obtained from Table 1.

Table 1 – Minimum Animal Water Requirements [1/]

Kind of Livestock	Daily Requirement Gals. Per Head Per Day
Beef cattle	12
Horse	6
Dairy Cattle Drinking Only	
Lactating	25
Non-lactating	10
Sheep and Goats	2
Swine	2

[1/] These requirements vary with climatic conditions, kinds of feed, size of animals, and other factors, and may be increased as necessary.

For recreation areas, the water capacity shall be adequate for all planned uses. Typical examples are drinking water, fire protection, showers, flush toilets, and irrigation of landscaped areas.

Pipelines used in wastewater recycling systems as part of an animal waste management system must have adequate capacity. Where flush tanks are used, the capacity must be adequate to refill flush tanks within the allotted time between flushing events. For pump flush systems or hose wash systems, the pipeline must be capable of supplying the required flow rate.

Additional water capacity will be provided for wildlife, when applicable.

Sanitary protection. If water from the pipeline is to be used for human consumption, applicable state and local regulations shall be met.

Pipelines that have a potential to cross-connect with the public water supply system shall have a properly installed backflow prevention device or air gap, as required by the local water utility's Cross-connection Control Program [Tennessee Code Annotated § 68-221-711 and TDEC, Division of Water Supply Rule 1200-5-1.17(6)].
Pipelines that are connected to potable well systems shall include measures to prevent backflow or back-siphonage to the well. Acceptable measures to prevent backflow are the use of an air gap or double check valve.

Pipe. All pipes must withstand the pressure to which they will be subjected, including hydraulic transients and internal and external pressures. As a safety factor against surge or water hammer, the working pressure should not exceed 72 percent of the pressure rating of the pipe, and the design flow velocity at system capacity should not exceed 5 feet/second. If either of these limits is exceeded, special consideration must be given to flow conditions, and measures must be taken to adequately protect the pipeline against surge.

Steel pipe shall meet the requirements of AWWA Specification C-200.

Plastic pipe shall conform to the requirements of the following American Society for Testing and Materials (ASTM) specifications, as applicable:

D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80

D 1785 Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

D 2104 Polyethylene (PE) Plastic Pipe, Schedule 40

D 2239 Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter

D 2241 Poly(Vinyl Chloride) (PVC), Pressure-Rated Pipe (SDR)

D 2282 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)

D 2447 Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter

D 2513 Thermoplastic Gas Pressure Pipe, Tubing and Fittings

D 2737 Polyethylene (PE) Plastic Tubing

D 2672 Joints for IPS PVC Using Solvent Cement

D 3035 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter

AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches

AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inches

Plastic pressure pipe fittings shall conform to the following ASTM specifications, as applicable:

D 2464 Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

D 2466 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

D 2467 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

D 2468 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40

D 2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe

D 2683 Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

D 3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

D 3261 Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

Solvents for solvent-welded plastic pipe joints shall conform to the following ASTM specifications, as applicable:

D 2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

D 2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings

D 2855 Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings

Rubber gaskets for pipe joints shall conform to the requirements of ASTM F477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

Drainage. Valves or unions shall be installed at low points in the pipeline, so that the line can be drained as needed. Check valves shall be installed as needed to protect ground water quality or maintain a full pipeline.

Vents. Design shall provide for entry and removal of air along the pipeline, as needed, to prevent air locking or pipe collapse. If parts of the line are above the hydraulic gradient, periodic use of an air pump may be required. Provisions shall be made for air relief and vacuum relief as needed to protect the pipeline.

Pressure Relief Valves. A pressure relief valve shall be installed between the pump discharge and the pipeline, if excessive pressure can build up when all valves are closed. Pressure relief valves or surge chamber shall be installed on the discharge side of check valves where a reversal of flow may occur and at the end of the pipeline, if needed to relieve surges.

Pressure relief valves shall be no smaller than ¼-inch diameter nominal size for each inch of the pipeline diameter and set to open at a pressure no greater than 5 psi above the pressure rating of the pipe.

Joints. Watertight joints that have a strength that equals or exceeds that of the pipe shall be used. Couplings must be of material compatible with that of the pipe. If they are made of material susceptible to corrosion, provisions must be made to protect them.

Protection. When steel pipe is used, interior protective coatings shall be provided in accordance with NRCS conservation practice standard Irrigation Pipeline, Code 430. If a coal-tar enamel protective coating is needed for corrosion protection, the coating shall meet the requirements of AWWA Specification C-203.

Steel pipe installed aboveground shall be galvanized or shall be protected with a suitable protective paint coating, including a primer coat and two or more final coats.

Plastic pipe installed aboveground shall be resistant to ultraviolet light throughout the intended life of the pipe.

All pipes shall be protected from hazards presented by traffic, farm operations, freezing temperatures, fire, thermal expansion, and contraction. Reasonable measures should be taken to protect the pipe from potential vandalism. The minimum depth of cover for pipe shall be as shown in Table 2.

Vegetation. Disturbed areas shall be established with vegetation or otherwise stabilized as soon as practical after construction. Seedbed preparation, seeding, fertilizing, and mulching shall conform to NRCS conservation practice standard Critical Area Planting, Code 342.

Table 2 – Minimum Depth of Cover for Pipelines

Pipe Diameter (inches)	**Depth of Cover (inches)**	
	Pipe Susceptible to Hazards Imposed by Farming Operations	Pipe Not Susceptible to Hazards Imposed by Farming Operations
½ - 2½	18	12
3 - 5	24	18
6 - 8	30	24

Visual Resources. The visual design of pipelines and appurtenances in areas of high public visibility shall be carefully considered.

CONSIDERATIONS

No special considerations have been identified for this practice.

PLANS AND SPECIFICATIONS

Plans and specifications for installing pipelines shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the pipeline is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

The National Engineering Field Handbook, Part 650, Chapter 5, Preparation of Engineering Plans, will guide the development of plans.

OPERATION AND MAINTENANCE

An O&M plan specific to the type of installed pipeline shall be provided to the landowner. The plan shall include, but not be limited to, the following provisions:

- Opening/closing valves to prevent excessive water hammer.
- Filling at the specified rate requirements.
- Inspecting and testing valves, pressure regulators, pumps, switches, and other appurtenances.
- Maintaining erosion protection at outlets.
- Checking for debris, minerals, algae, and other materials which may restrict system flow.
- Draining and/or providing for cold weather operation of the system.

REFERENCES

American Society for Testing and Materials (ASTM) Specifications
D1527, D1785, D2104, D2239, D2241, D2282, D2447, D2513, D2737, D2672, D3035, D2464, D2466, D2467, D2468, D2609, D2683, D3139, D3261, D2235, D2564, D2855, F477

AWWA Specifications
C200, C203, C900, C901

National Engineering Field Handbook, Part 650, Chapter 5, Preparation of Engineering Plans

NRCS Conservation Practice Standard
Critical Area Planting, Code 342
Irrigation Pipeline, Code 430

Tennessee Code Annotated § 68-221-711

Tennessee Department of Environment and Conservation, Division of Water Supply
Rule 1200-5-1.17(6)